

a unit for operating the robot, and
a display unit that can display the gray scale visual image and an image processing manipulation menu; and
an image processing unit used for image processing; and
said display unit displays an indication for generating or editing of the robot program and an indication for manipulation of image processing, together with the gray scale visual image of the robot simultaneously and allows a user to select between using the pendant for image processing teaching and robot teaching/control.

REMARKS

In the Office Action mailed February 12, 2003 the Examiner noted that claims 1-13 were pending. Claims 4, 8 and 11 have been amended, new claim 14 has been added and, thus, in view of the forgoing claims 1-14 remain pending for reconsideration which is requested. No new matter has been added. The Examiner's rejections are traversed below.

On page 2 of the Action the rejected claims 1-7 and 11-13 under 35 U.S.C. section 112, paragraph 1. Essentially, the Examiner indicates the reason for the need for the converting of image data stored in the memory is not understood, the term "intermediate image data" data is not understood and the reason for the converting of the intermediate data is not understood.

The image data stored in the memory may be of a different gray scale resolution than what the pendant display can actually display. If this is the case, the data in the memory needs to be converted to the gray scale resolution of the pendant display. This is noted on page 25, line 21 to page 26, line 2 of the application specification.

The term intermediate image data can be camera image data that has been processed, such as by binarization, edge enhancement, etc., before it is a final image or processed in a final stage. This is a well understood term in image processing for an intermediate image that is not the final version of an image. See, for example, (http://www.dpreview.com/learn/Glossary/Digital_Imaging/JPEG_01.htm) where the term is used for an intermediate stage image that is in one of several stages of editing before being finally compressed. Because such an intermediate image may have its gray scale resolution changed, it may need converting for the same reasons as the data in the memory, as discussed above.

Withdrawal of the rejection of claims 1-7 and 11-13 is requested.

On page 2 of the Action the rejected claims 1, 2, 4 and 8 under 35 U.S.C. section 112,

paragraph 1. Essentially the Examiner indicates that the terms switching mode and superposition mode are not supported in the specification and not understood. The Examiner is requested to see page 7, lines 5-9 and page 9, lines 2-6 for the support for these terms in the specification. The passages, according to the understanding of the undersigned, explain that the display unit can be set for display of an image and the image processing manipulation (editing or generating a program) in a switching mode or a superposition mode, so that the image and program are either switched between or both displayed at the same time.

Withdrawal of the rejection of claims 1, 2, 4 and 8 is requested.

Page 3 of the Office Action rejects all claims under 35 U.S.C. § 103 over Tanabe and Jyumonji.

The present invention is directed to a robot controller that includes image processing capability and a pendant used to control the robot or program (create or edit a program) the robot as well as including a display unit for image processing operations. The image processing capability includes a camera for capturing an image and processing for displaying the captured image on the pendant. As a display unit the pendant can thus display not only a program but also the image captured by the camera. The pendant, as a combined display unit and programming unit, can use a captured image as part teaching the robot. For example, the pendant can be used position a robot into a desired position, to display an image of the robot at that position and that image can be processed to program the robot to move to that position. In an image processing teaching mode the pendant can be used to specify an image to be processed for other purposes, such as position recognition. The pendant can also be used to control or manipulate the operations of the image processing, such as to initiate edge enhancement of a captured image. As a result, the present invention is a system that allows the operator to control/manipulate/program a robot, display an image from a camera, manipulate image processing operations and/or confirm image processing. The prior art does not teach or suggest such.

The Examiner cites Jyumonji for its alleged teaching of a obtaining image data from a camera.

The Examiner cites Tanabe for allegedly teaching or suggesting the remainder of the features of the claims.

In particular the Examiner notes that Tanabe discusses a pendant 10 displaying "a state

of the robot" and "input data" and cites Tanabe col. 3, at about lines 22-31. In making this comparison the Examiner appears to consider the robot state as including the input data and equates the input data with the image captured by the camera and displayed on the pendant in the present invention. Tanabe discusses several different types of inputs, some associated with the pendant and some with another device, such as a personal computer. These inputs include: input of a command, such as a teaching command, input into the personal computer via a jog input device; input via a touch panel of the pendant display for controlling operations of the robot; and graphical input through though a graphical user interface supplied to the personal computer. The discussion of possible types of input data in Tanabe, even input data that is not destined for the pendant, does not include an image captured by a camera. That is, Tanabe says nothing and suggests nothing about having a pendant that can be used for teaching/control of a robot and/or teaching an image processing system and that displays an image supplied by a camera, as in the claimed invention. Jyumonji adds nothing to Tanabe with respect to this feature of the claimed invention.

It is submitted that the present invention is patentably distinguishable over the prior art for the above discussed reason.

In making the rejection of a number of the claims, starting on page 3, the Examiner used claim 4 as a model. On page 3 of this rejection of claim 4, the Examiner particularly equated the "input data" discussed in the phrase "... the liquid display unit 13 for displaying information of the robot and input data ... (see col. 3, about lines 26-32) with the image converted into gray scale of claim 4. Tanabe discusses nothing about and does not mention at all converting an image into a gray scale image or taking images from a camera or image processing operations with a camera image or processing intermediate images resulting from a camera image. Tanabe does not discuss the integration of a display concerned with robot manipulation and robot operational programming or a display concerned with image processing and manipulation of image processing as is the case with the present claimed invention. Tanabe is involved with using a personal computer to simplify robot manipulation and robot programming. In contrast, the present invention is designed to enable an operator to perform effective manipulation associated with image processing, confirm the image processing and control the robot using a pendant. The result is a pendant system with which the operator can control the robot, control image processing operations and confirm the image processing operations. Nothing in the prior art of Tanabe and/or Jyumonji teach or suggest this.

With respect to claim 3, on page 6 of the Office Action the Examiner alleges that Tanabe at col. 3, lines 45-47 intuitively or impliedly teaches the feature of claim 3 related to superposing geometric graphics on the displayed camera image. This feature of the present invention is more particularly described at page 27, lines 20-22, page 28, lines 12-13 and page 30, lines 20-24. There is nothing in Tanabe that teaches or suggests such graphic superposition operations.

It is submitted that the invention of claims 1-13 distinguishes over the prior art and withdrawal of the rejection is requested.

New claim 14 emphasizes the above discussed features of the invention. Nothing in the prior art teaches or suggests such. It is submitted that new claim 14 distinguishes over the prior art.


It is submitted that the claims satisfy the requirements of 35 U.S.C. 112. It is further submitted that the claims are not taught, disclosed or suggested by the prior art. The claims are therefore in a condition suitable for allowance. An early Notice of Allowance is requested.

If any further fees, other than and except for the issue fee, are necessary with respect to this paper, the U.S.P.T.O. is requested to obtain the same from deposit account number 19-3935.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND the following claims:

1. (Previously Amended) An image processing apparatus for a robot which is built in a robot controller, and has a portable teaching pendant connected thereto, comprising:

a unit for fetching an image from a camera;

memory storing image data from the camera or intermediate image data obtained in a stage of image processing; and

a unit for converting image data from the camera, the image data from the camera stored in the memory, or the intermediate image data into a gray scale or a color scale, wherein:

said teaching pendant comprises a display unit and a unit used for manipulation for image processing and display of the converted image data; and

said display unit displays an image and indication for manipulation of image processing simultaneously, or allows a user to select either a switching mode or a superposition mode.

2. (Previously Amended) An image processing apparatus for a robot which is designed independent of the robot controller, and has a portable teaching pendant connected thereto, comprising:

a unit for fetching an image from a camera;

memory storing image data from the camera or intermediate image data obtained in a stage of image processing; and

a unit for converting image data from the camera, the image data from the camera stored in the memory, or the intermediate image data into a gray scale or a color scale, wherein:

said teaching pendant comprises a display unit and a unit used for manipulation for image processing and display of the converted image data; and

said display unit displays an image and indication for manipulation of image processing simultaneously, or allows a user to select either a switching mode or a superposition mode,

wherein the robot is designed independently of the robot controller.

3. (Previously Amended) The apparatus according to claim 1, further comprising:

a unit for displaying and superposing geometric graphics on the image displayed on the display unit in accordance with the operation procedure of image processing and specifying an

image processing with respect to the image.

4. (Currently Amended) An image processing apparatus for a robot which is built in a robot controller, comprising:

- a unit for fetching an image from a camera;
- memory which stores image data from the camera or intermediate image data obtained in a stage of image processing; and
- a unit for converting image data from the camera, the image data from the camera stored in the memory, or intermediate image data into a gray scale or a color scale, wherein:
 - a portable teaching pendant is connected to said robot controller through a cable; and
 - said teaching pendant comprises a unit for generating or editing a robot program, a unit for operating the robot, and a display unit, and can display on the display unit [an image converted into the gray scale] the converted image, and comprises a unit used for manipulation for image processing; and
- said display unit displays, indication for generating or editing of the robot a program and indication for manipulation of image processing, together with an image simultaneously, or allows a user to select either a switching mode or a superposition mode.

5. (Original) The apparatus according to claim 4, further comprising:

- a unit for displaying and superposing geometric graphics on the image displayed on the display unit in accordance with the operation procedure of the image processing and specifying an image processing with respect to the image.

6. (Previously Amended) The apparatus according to claim 1, wherein

- a part of the operation unit of the teaching pendant is configured by a touch panel.

7. (Original) The apparatus according to claim 4, further comprising

- a unit for incorporating an instruction to process an image into a program of a robot.

8. (Currently Amended) A method, comprising:

- fetching an image from a camera;
- storing image data from the camera or intermediate image data obtained in a stage of image processing; and

converting image data from the camera, the image data from the camera stored in the memory, or the intermediate image data into a gray scale or a color scale; and
displaying the converted image data on a teaching pendant,
wherein said displaying displays the image data and indication for manipulation for image processing simultaneously, or allows a user to enter a switching mode or a superposition mode.

9. (Previously Added) An apparatus, comprising:
a image processor receiving an image from a camera;
a robot control unit controlling a robot; and
a portable teaching pendant displaying the image and allowing a user to control the robot using the robot control unit.

10. (Previously Added) A method, comprising:
receiving an image from a camera; and
displaying the image on a portable teaching pendant; and
controlling the robot using the portable teaching pendant.

11. (Currently Amended) The apparatus according to claim [1] 2, further comprising:
a unit for displaying and superposing geometric graphics on the image displayed on the display unit in accordance with the operation procedure of image processing and specifying an image processing with respect to the image.

12. (Previously Added) The apparatus according to claim 2, wherein
a part of the operation unit of the teaching pendant is configured by a touch panel.

13. (Previously Added) The apparatus according to claim 4, wherein
a part of the operation unit of the teaching pendant is configured by a touch panel.

Please ADD the following claims:

14. (New) An image processing apparatus for a robot which is built in a robot controller, comprising:
a unit for fetching a visual image of the robot from a camera;

memory which stores the visual image from the camera or obtained in a stage of image processing; and

a unit for converting the visual image into a gray scale visual image;

a portable teaching pendant connected to said robot controller through a cable; and said teaching pendant comprising:

a unit for generating or editing a robot program,

a unit for operating the robot, and

a display unit that can display the gray scale visual image and an image processing manipulation menu; and

an image processing unit used for image processing; and

said display unit displays an indication for generating or editing of the robot program and an indication for manipulation of image processing, together with the gray scale visual image of the robot simultaneously and allows a user to select between using the pendant for image processing teaching and robot teaching/control.